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ABSTRACT

As computers become an integral part of classrooms, educators need to determine if there are uses of computers that are supported by research. Recent research has examined uses of technology in the classroom for writing instruction, electronic literacy environment, and electronic portfolios. Results of these studies on writing instruction indicate that technology helps children to focus on content rather than mechanics; encourages the production of more and better developed essays; and reduces the drudgery of editing. Research also demonstrates that accessing electronic literacy environments produces: increased specialized vocabulary and coherence; wide-ranging possibilities for communication and expression; and improved mechanics of writing. In terms of electronic portfolios, studies demonstrate that they encourage students to align their school work with performance standards; provide an opportunity for students to share their literacy development with others; increase knowledge of technology; and improve literacy overall. With support, teachers can add powerful computing tools to the host of instructional strategies they use to engage students in meaningful instruction. (Contains 22 references.) (RS)

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Technology & literacy: Is there a positive relationship?

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In this article, the authors explore three uses of technology in the classroom: writing instruction, electronic literacy environment, and electronic portfolios.

During the past decade the number of computers used in classrooms has significantly increased. In 1997, schools averaged one computer for every six students nationwide (Education Week, 1998); ten years ago there was approximately one computer for 30 students. The annual budget for school computers topped $5 billion last year (Education Week, 1998). Healy (1998) maintains we need to assess the impact of computers and technology on student literacy as schools attempt to expand the numbers of computers per classroom. We must determine, if, in fact, computers improve literacy. Healy (1999) also explains that we need to understand a complex set of issues: when should computers be introduced into our classrooms and what computer activities are most beneficial for students. It may very well be, as Reinking (1998) notes that "questions about whether students using word processing write as well or better than those using conventional materials have given way to questions about how students might adapt to and employ effectively electronic forms of reading and writing" (p. xxiv). As computers become an integral part of our classrooms, educators need to determine if there are uses of computers that are supported by research. In this article we explore three uses of technology in the classroom: writing instruction; electronic literacy environments; and electronic portfolios.

Writing Instruction

Dahl and Farnan (1998) point out in their book *Children's Writing*, that computers and technology have significantly altered the ways in which people experience the world. Researchers have attempted to document positive outcomes when students use computers as part of their writing process program. As Dahl and Farnan note, the research results are complex. For example, Russell (1991), in her meta-analysis, found that the relationship between technology and writing was significantly influenced by the social interactions that students had in the computer lab, although the writing was higher quality when students used word processing software and computers.

In a study of first graders' use of word processing software, Jones and Pellegrini (1996) found that the technology facilitated the students' writing of narratives. These researchers hypothesized that the use of the computer shifted the focus away from the mechanical aspects of writing to focus on words and ideas. Similarly, in a case study of a 5-year-old writer, Cochran-Smith, Kahn, and Paris (1990) note that the computer provided a mechanism that supported the child's writing. More specifically, the computer allowed the child to focus more directly on her words and ideas than on her handwriting, letter formation, and alignment of words.

Similar results have been documented for older students as well. In their study of middle school students, Owston, Murphy, and Wideman (1992) found that students wrote higher quality essays using word processing software than they did when they wrote their essays in cursive. The students in their study were all experienced computer users. The researchers hypothesized that the reason for the high quality was related to the number of times students revised their work on the computer. Odenthal (1992) found similar results among second language learners. Haas (1989) documented similar results; she found that easy-to-use software programs facilitated the revision process. The results of these studies indicate that technology:

1. helps children to focus on content rather than mechanics;
2. encourages the production of more and better developed essays; and
3. reduces the drudgery of editing.

Electronic Literacy Environments

Research indicates a positive relationship between electronic environments and literacy (Baines, 1998; Beach & Lundell, 1998; Kieffer, Hale, & Templeton, 1998). Reading and writing in an electronic literacy environment differs from traditional classroom activities. Typically, when students are asked to write papers, they know their audience and the expectations of the teachers. However, in writing something for the web that anyone can read, students "place a premium on the paper's accuracy, use of technical and specialized vocabulary, and degree of coherence" (Alvarez, 1998, p.45).

In addition to publishing on the world wide web (WWW), a number of electronic conversations can be facilitated. Students can establish two kinds of conversations: asynchronous (such as email) or synchronous (such as chat rooms). Participants in these conversations are required to access prior knowledge, read strings of messages, provide written responses, and master the technology. All of these are useful skills and relate to overall literacy development. Interestingly, most students report enjoying the experience because, unlike face-to-face conversations, they are not interrupted when constructing their responses (Beach & Lundell, 1998).

For example, Garner and Gillingham (1998) describe a series of internet interactions that students have. In a year-long partnership, students in two classrooms are introduced, thus providing an opportunity for Yup'ik Eskimo children and adolescents the opportunity to practice speaking, reading, and writing their second language, English. The authors note that bilingualism was important to this village, located 300 miles from the nearest road. The internet was one of the few places that English could be practiced authentically and comfortably. The teachers observed significant progress for both groups of students, noting "unity of expression, increased grammatical competence, and improvement in the mechanics of spelling, capitalization, and punctuation" (p. 223). These studies demonstrate that accessing electronic literacy environments produces:

1. increased specialized vocabulary and coherence;

2. wide ranging possibilities for communication and expression; and

3. improved mechanics of writing.

Electronic Portfolios

Authentic assessments, such as portfolios, have been a significant focus for assessment professionals and teachers during the past decade (Flippo, 1997; Valencia, Hiebert, & Afflerbach, 1994). The need to document learning and progress beyond standardize tests, as well as the desire to showcase exemplary pieces of student work, has provided the impetus for new types of portfolios (Kieffer & Morrison, 1994). Portfolios can look like scrapbooks, folders, photo albums, or file cabinets.

As a result, a number of electronic versions of portfolios have been developed. Some of them are pre-programmed such as the Grady Profile (Grady, 1991). Others are developed by professional organizations or teachers. For example, the Annenberg Institute for School Reform and the Coalition of Essential Schools have been investigating digital portfolios and software programs that create a multimedia collection of student work (Niguidula, 1995). Still others require that students create their own versions by using word processing and multimedia software (Kieffer, Hale, & Templeton, 1998).

Electronic portfolios require that students access technology while demonstrating their personal growth. Students can collect artifacts for their portfolios and align them with the performance standards of the school (Fisher, Sax, & Jorgensen, 1998). For example, students may be expected to demonstrate their ability to read, write, speak and listen for a variety of purposes and audiences. Their portfolios should contain evidence, across grade levels, that they accomplished this standard. Some students will choose to store electronic versions of text in their portfolios. Others will scan photos, sound clips, or video clips into a software program for later use. Still others will use multimedia authoring software and CD-ROMs to increase the interactivity the reviewer has with the contents.

In a recent study of the outcomes of electronic portfolios, Hedberg (1998) studied 60 high school students. He documented increased knowledge of technology, increased literacy skills, and increased interest in science when his students were required to maintain and submit electronic portfolios of the work. He hypothesizes that the effect of electronic portfolios is due in a large part to the increase the ownership and pride by students. He notes that students in his classes had basic computer skills and most could type. Again, the implications for teachers are clear - student need access to computers, word processing software, and keyboarding if they are to participate in many of these electronic literacy events. These studies demonstrate that the use of electronic portfolios:

1. encourage students to align their school work with performance standards;

2. provide an opportunity for students to share their literacy development with others;

3. increase knowledge of technology; and

4. improve literacy overall.

Conclusions

We offer a qualified *yes* to the question, "Are computers a welcome addition to the classroom?" When computers are used as an instructional tool by teachers who have received appropriate training and support, the money is well spent. However, the lack of appropriate staff development can result in expensive equipment sitting unused. Computers will be a part of the twenty-first century and our students will use them for a variety of reasons including internet access, writing, recordkeeping, and email. With support, teachers can add this powerful tool to the host of instructional strategies they use to engage students in meaningful instruction.

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